Express Mail No. EV447225325US

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants	:	David S. Wardrop et al.
Application No.	:	10/017,483
Confirmation No.	:	5180
Filed	:	December 14, 2001
For	:	FUEL CELL SYSTEM SHUNT REGULATOR METHOD AND APPARATUS

Examiner	:	Raymond Alejandro
Art Unit	:	1745
Docket No.	:	130109.431
Date	:	August 16, 2004

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANT'S BRIEF (37 CFR 1.192)

Commissioner for Patents:

This brief is in furtherance of the Notice of Appeal, filed in this case on 20 May 2004. The fees required under Section 1.17(c), and any required request for extension of time for filing this brief and fees therefor, are dealt with in the accompanying transmittal letter.

08/18/2004 HALI11 00000067 10017483
01 FC:1402 330.00 OP

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest on this appeal is Ballard Power Systems Inc.

II. RELATED APPEALS AND INTERFERENCES

Appellants' legal representative and the real party in interest are unaware of any appeal or interference which will directly affect, be directly affected by, or have a bearing on the Board's decision in the present appeal.

III. STATUS OF CLAIMS

Claims 1-7 and 9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,850,695 to Keller et al. (hereinafter Keller) in view of European Patent Application Publication EP-982788 (hereinafter EP-982788). *Final Office Action* mailed 11 Nov. 2003. Claim 8 stands withdrawn from consideration as directed to an unelected species, but which is entitled to consideration under 37 C.F.R. 1.141 should generic claim 1 be finally found allowable. *Office Action* mailed 18 Jun. 2003. Claims 10-20 have been canceled.

Appellants appeal the rejection of each of claims 1-7 and 9, and respectfully request consideration of claim 8 should claim 1 be found allowable.

All pending active claims are attached as Appendix A.

IV. STATUS OF AMENDMENTS

No amendments have been filed following the final rejection.

V. SUMMARY OF INVENTION

To summarize, without intending to limit or otherwise affect the scope of the claims, the exemplary embodiments of Applicants' invention are directed to fuel cell systems 10 for powering a work load 12, the fuel cell system including a fuel cell stack 14 and a shunt regulator 20 having a threshold detector 24, a dump load 22, and a transistorized power switching element 26. *Application*, page 5, line 23-page 6, line 23; and Figures 1 and 2. The threshold detector 24 identifies when an abnormally high voltage rises. *Application*, page 6, lines 17-23. In response, the power switching element 26 routes power from the high voltage bus to the dump load 22. *Id.*

The dump load 22 acts as an electrical energy sink. *Application*, page, 7, lines 6-24. The dump load 22 may return dissipated energy to the fuel cell stack 14 in the form of heat. *Application*, page, 7, lines 16-18. The power switching element 26 can also shunt power to the dump load 22 when a digital control signal is set, for example, at startup or during cold start conditions. *Application*, page 6, line 25-page 7, line 5.

VI. ISSUES

The following issues are presented for review:

A. Does the combination of Keller and EP-982788 fail to teach or suggest a first transistor coupled for activation via a first threshold detector; and *a first dump load*, wherein *the first transistor is responsive* to the stack terminal voltage across the first set of fuel cells *to selectively couple the first dump load in parallel with the first set of fuel cells when the stack terminal voltage* across the first set of solid polymer electrochemical fuel cells *exceeds a threshold voltage and to uncouple the first dump load when the stack terminal voltage* across the first set of solid polymer electrochemical fuel cells *is below the threshold voltage*?

B. Does the combination of Keller and EP-982788 fail to teach or suggest *a second threshold detector, a second transistor, and a second dump load* wherein the second transistor is responsive to the stack terminal voltage across the second set of fuel cells to selectively couple the second dump load in parallel with the second set of solid polymer electrochemical fuel cells when the stack terminal voltage across the second set of fuel cells exceeds a threshold voltage and to uncouple the second dump load when the stack terminal voltage across the second set of solid polymer electrochemical fuel cells is below the threshold voltage?

C. Does the combination of Keller and EP-982788 fail to teach or suggest a *dump load is positioned upstream* from the solid polymer electrochemical fuel cells *in an air flow* for providing heat to the solid polymer electrochemical fuel cells?

D. Does the combination of Keller and EP-982788 fail to teach or suggest a *dump load is positioned proximate* the solid polymer electrochemical fuel cells for providing heat thereto?

E. Does the combination of Keller and EP-982788 fail to teach or suggest a *capacitance electrically coupled across the dump load*?

F. Does the combination of Keller and EP-982788 fail to teach or suggest an *inductance electrically coupled in series* between the first set of solid polymer electrochemical fuel cells and the dump load?

G. Does the combination of Keller and EP-982788 fail to teach or suggest the use of an n-channel *field effect transistor* that is responsive to the stack terminal voltage across the first set of fuel cells to selectively couple the first dump load in parallel with the first set of fuel cells when the stack terminal voltage across the first set of solid polymer electrochemical fuel cells exceeds a threshold voltage and to uncouple the first dump load when the stack terminal voltage across the first set of solid polymer electrochemical fuel cells is below the threshold voltage?

VII. GROUPING OF CLAIMS

Independent claim 1 and claim 9 which depends from claim 1 stand or fall together. In particular, these claims recite "a first transistor coupled for activation via the first threshold detector; and a first dump load, wherein the first transistor is responsive to the stack terminal voltage across the first set of fuel cells to selectively couple the first dump load in parallel with the first set of fuel cells when the stack terminal voltage across the first set of solid polymer electrochemical fuel cells exceeds a threshold voltage and to uncouple the first dump load when the stack terminal voltage across the first set of solid polymer electrochemical fuel cells is below the threshold voltage."

Claim 2 depends from claim 1 and stands and falls on its own. In particular, claim 2 further recites "a second threshold detector," "a second transistor," and "a second dump load" which are not recited by any other claims.

Claim 3 depends from claim 1 and stands and falls on its own. In particular, claim 3 further recites "wherein the dump load is positioned upstream from the solid polymer electrochemical fuel cells in an air flow for providing heat to the solid polymer electrochemical fuel cells" which is not recited by any other claims.

Claim 4 depends from claim 1 and stands and fall on its own. In particular, claim 4 further recites "wherein the dump load is positioned proximate the solid polymer electrochemical fuel cells for providing heat thereto" which is not recited by any other claims.

Claim 5 depends from claim 1 and stands and fall on its own. In particular, claim 5 further recites "a capacitance electrically coupled across the dump load" which is not recited by any other claims.

Claim 6 depends from claim 1 and stands and fall on its own. In particular, claim 6 further recites "an inductance electrically coupled in series between the first set of solid polymer electrochemical fuel cells and the dump load" which is not recited by any other claims.

Claim 7 depends from claim 1 and stands and fall on its own. In particular, claim 7 further recites "wherein the first transistor is an n-channel field effect transistor" which is not recited by any other claims.

VIII. ARGUMENT: ART OF RECORD DOES NOT ESTABLISH *PRIMA FACIE* CASE OF UNPATENTABILITY, OR *IN ARGUENDO* HAS BEEN REBUTTED

The Examiner initially bears the burden of establishing a *prima facie* case of obviousness. *In re Bell*, 26 U.S.P.Q.2d 1529 (Fed. Cir. 1993); *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984); *MPEP* § 2142. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant. *MPEP* § 2142. If examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent." *MPEP* § 2107 (citing *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992)); *In Re Glaug* *5 (Fed. Cir., 15 March 2002) (Fed. Cir. BBS). Accordingly, unless and until an examiner presents evidence establishing *prima facie* unpatentability, an applicant is entitled to a patent on all claims presented for examination.

In order for an examiner to establish a *prima facie* case that an invention, as defined by a claim at issue, is obvious the examiner must (1) interpret the claim at issue; (2) define one or more prior art reference components relevant to the claim at issue; (3) ascertain the differences between the one or more prior art reference components and the elements of the claim at issue; and (4) adduce objective evidence which establishes, under a preponderance of the evidence standard, a teaching to modify the teachings of the prior art reference components such that the prior art reference components can be used to construct a device substantially equivalent to the claim at issue. *MPEP* § 2142.

To meet this burden, "the Examiner must show that there is either a suggestion in the art to produce the claimed invention or a compelling motivation based on sound scientific principles." *Ex parte Kranz*, 19 U.S.P.Q.2d 1216, 1218 (Bd. Pat. App. & Interf. 1991). To show a suggestion in the art, the Examiner must show that "the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." *Bell*, at 1531. The MPEP sets out three proper sources of prior art reference components, including: 1) patents as defined by 35 U.S.C. § 102; 2) printed publications as defined by 35 U.S.C. § 102; and 3) information (*e.g.*, scientific principles) deemed to be "well known in the art" as defined under 35 U.S.C. § 102. *MPEP* § 2141.

With one or more prior art components so defined and drawn from the proper prior art sources, the differences between the one or more prior art reference components and the elements of the claim at issue are to be ascertained. Thereafter, in order to establish a case of *prima facie* obviousness, an examiner must set forth a rationale, supported by objective evidence sufficient to demonstrate under a preponderance of the evidence standard, that in the prior art extant at the time of invention there was a teaching to modify and/or combine the one or more prior art reference components to construct a device practicably equivalent to the claim at issue. *MPEP* § 2142.

The preferable evidence relied upon is an express teaching to modify/combine within the properly defined objectively verifiable sources of prior art. In the absence of such express teaching, an examiner may attempt to establish a rationale to support a finding of such teaching reasoned from, or based upon, express teachings taken from the defined proper sources of such

evidence (*i.e.*, properly defined objectively verifiable sources of prior art). *MPEP* § 2144; *In re Dembcizak*, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1998).

The MPEP offers guidance to Examiners in avoiding the pitfalls associated with the tendency to subconsciously use impermissible "hindsight" when an examiner attempts to establish such a rationale. The MPEP has set forth at least two rules to ensure against the likelihood of such impermissible use of hindsight. The first rule is that:

> under 35 U.S.C. 103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information,[1] the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of an Applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search, and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon an Applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

MPEP § 2142 (emphasis added). Thus, if the only objective evidence of such teaching to modify and/or combine prior art reference components is an applicant's disclosure, no evidence of such teaching exists.

The second rule is that if an examiner attempts to rely on some advantage or expected beneficial result that would have been produced by a modification and/or combination of the prior art reference components as evidence to support a rationale to establish such teachings to modify and/or combine prior art reference components, the MPEP requires that such advantage or expected beneficial result be objectively verifiable teachings present in the acceptable sources of prior art (or drawn from a convincing line of reasoning based on objectively verifiable established scientific principles or teachings). *MPEP* § 2144. Thus, as a guide to avoid the use of impermissible hindsight, these rules from the MPEP make clear that absent some objective evidence, sufficient to persuade under a preponderance of the evidence standard, no teaching of such modification and/or combination exists.

---

[1] "Factual information" is information actually existing or occurring, as distinguished from mere supposition or opinion. *Black's Law Dictionary* 532 (5th ed. 1979).

A. Summary of References Relied On By Examiner

1. U.S. patent 3,850,695 issued to Keller et al.

U.S. patent 3,850,695 issued to Keller et al. (hereinafter Keller) is generally directed to a voltage regulator system for use with a fuel cell stack. In particular, Keller is directed to the intermittent operation of a pump feeding fuel to the fuel cell based on power consumed by the work load and/or to maintain a sufficiently high voltage on the output bus. *Keller*, Abstract. Keller further teaches adjusting the frequency and/or duration of the pumping cycle to compensate for the drop in concentration of fuel resulting from re-circulation of partly spent fuel. *Keller*, Abstract; col. 3, line 28-col. 4, line 25; and col. 4, line 44-col. 5, line 3.

Keller shows the fuel cell stack 2 supplying power to a load 3, as well as to a motor 7 that is coupled to drive a pump 8 that supplies fuel to the fuel cell stack 2. *Keller*, Figure. A monitoring circuit means 4 monitors the current drawn by the load 3, adjustably supplying power to the motor 7 via control circuit means 5 including a transistor 64 to cause the pump 8 to supply fuel to the fuel cell stack 2 in proportion to the current draw. *Keller*, col. 2, lines 3-15, and Figure.

While supplying fuel based on current draw (*i.e.*, current regulation) will typically reduce the likelihood of the voltage on the output bus falling below a defined threshold, Keller teaches two stages of voltage regulation for those instances where the current regulation is not sufficient to also maintain the voltage. *Keller*, col. 2, line 60-col. 4, line 25.

Both stages employ the monitoring circuit means 4 to monitor the voltage across the output bus via a measuring resistor 31. In the first stage of voltage regulation, if the voltage falls below the defined value, a first voltage sensitive switch 22 supplies a signal to a monostable flip-flop 12 to drive the motor 7 and pump 8 via a regulating switch 24 for a defined period. *Keller*, col. 2, line 60-col. 3, line 5; and col. 7, line 66-col. 8, line 8. Importantly, when the voltage across the output bus *falls* below a defined threshold, the control circuit 5 will *increase* the duration and/or frequency of the motor/pump cycle in order to *compensate* by providing *more* fuel to the fuel cell stack. In the second stage of voltage regulation, should the output voltage fall below a defined threshold, a second voltage sensitive switch 23 causes switch 16 to shed the

load 3 until the operator opens and recloses a main switch 13. *Keller*, col. 3, lines 11-27; col. 8, lines 9-22, and Figure.

2. European Patent Application Publication EP-982788

EP-982788 is cited for disclosing "fuel cells as a power source using solid polymer electrolyte, and wherein the fuel cell system comprises an apparatus for safeguarding fuel cells against reverse polarization damage by monitoring the fuel cells in a stack thereof and altering the stack's operator and/or initiating corrective measure to protect filing cells in the stack when undesirable stack operating conditions are indicated." Final Office Action, mailed 24 Nov 2003, pp 6-7.

B. Rejection of claims 1 and 9 under 35 U.S.C. § 103(a) based on Keller in view of EP-982788

The final Office Action states that "applicants have basically or essentially argued that the load feature of the '695 patent apparently do [sic] not have the same functionality as the disclosed but not claimed feature of the instant application." *Office Action mailed November 24, 2003*, page 8 (emphasis in original). The final Office Action further states that "it is noted that the features upon which applicant relies (*i.e., the load including resistive element such as resistor for thermally dissipating excess power, or also including capacitive and/or inductive elements*) are not recited in the rejected claims." *Id.* The final Office Action concludes "[u]nless applicants clearly differentiate the structure of the claimed fuel cell stack assembly from the structure of the prior art fuel cell, it is contended that, for practical purposes, the fuel cell of the prior art is able to implement the defined requisite functionality to satisfy the claimed requirement." *Office Action mailed November 24, 2003*, page 9.

In this regard, the Examiner focused solely on the term "dump load" to the exclusion of other express limitations in the claims, which were discussed in Appellants' remarks in the prosecution (*i.e.*, Amendment filed October 28, 2003; Telephonic Conference of January 20, 2004; and Response After Final filed January 22, 2004). As was pointed out in the telephone conference of January 20, 2004 and Response After Final mailed January 22, 2004, the Office Actions to that date had *not* addressed the substantive limitations in the final subparagraph of

independent claim 1. In particular, claim 1 recites, *inter alia*, "a first transistor coupled for activation via the first threshold detector; and a first dump load, wherein *the first transistor is responsive* to the stack terminal voltage across the first set of fuel cells *to selectively couple the first dump load in parallel with the first set of fuel cells when the stack terminal voltage* across the first set of solid polymer electrochemical fuel cells *exceeds a threshold voltage and to uncouple the first dump load when the stack terminal voltage* across the first set of solid polymer electrochemical fuel cells *is below the threshold voltage.*" (Emphasis added.)

In the Advisory Action mailed February 23, 2004, the Examiner appears to acknowledge the limitations noted in italics above, however concludes that such is not sufficient to overcome the rejection. *Advisory Action mailed February 23, 2004*, paragraph 2. In particular, the Examiner states "the question to answer now is whether or not one of ordinary skill in the art would have sufficient sophistication to implement a reversed functionality based on the foregoing teachings. *Id.* (Emphasis in original.) The Examiner goes on to state "it is secondly noted that the prior art *itself* does not teach, suggest or reveal that an opposite functionality or behavior of its fuel cell system will definitely cause detrimental damages to the fuel cell system as a whole, therefore, one of ordinary skill would envision that such opposite functionality could be an obvious variation of the claimed invention as it will only be necessary to ***reset*** the fuel cell control system parameter to operate in an opposite fashion to satisfy the claimed requirement. *Id.* (Emphasis in original).

Thus, the Examiner contends that the electric motor of Keller constitutes a dump load, and that one of skill in the art would be motivated to modify the teachings of Keller "*to implement a reversed functionality*" purportedly rendering claim 1 obvious in view of Keller. Appellants respectfully disagree.

As discussed above, in its first stage voltage regulation scheme, Keller teaches *increasing* the power to the motor 7 in response to the output voltage *falling* below a defined threshold. *Keller*, col. 2, line 60–col. 3, line 5, and col. 7, line 66-col. 8, line 8. The power is increased by increasing the duration and/or frequency of the electrical coupling of the motor to the fuel cell battery. *Id.* Thus, Keller teaches *coupling* the motor 7 to the fuel cell stack 2 *when the output voltage falls below the threshold value* and ipso facto *uncoupling* the motor from the power

source *when the output voltage exceeds the threshold value.*. This operation "results in providing *additional supply of fuel* to the fuel cell battery 2" *Keller*, col. 8, lines 4-8 (emphasis added). Consequently, the fuel cell battery 2 will produce *more* power, *resulting in a higher voltage* on the output bus.

The Examiner contends that it would be within the ability of one of ordinary skill in the art to modify the teachings of Keller as stated above. The Examiner provides no objective teaching in the art for such modification or motivation for making such a modification. The Examiner appears to simply conclude that "one of ordinary skill would envision that such opposite functionality could be an obvious variation of the claimed invention because the "the prior art *itself* does not teach, suggest or reveal that an opposite functionality or behavior of its fuel cell system will definitely cause detrimental damages to the fuel cell system as a whole." *Advisory Action mailed February 23, 2004*, paragraph 2 (emphasis in original).

The fact that a prior art structure could be modified to produce the claimed invention would *not* have made the modification obvious unless the prior art suggested the desirability of the modification. *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992); *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). As noted above, there is no objective teaching in the art to modify the teachings of Keller as proposed by the Examiner. In reversing a determination of prima facie obviousness by the Board of Appeals, where the claimed structure would result simply from turning the prior art device upside down, the Federal Circuit noted that that such a reversal of the prior art device was not fairly suggested in the prior art. *In re Gordon*, at 902; also see *MPEP* § 2143.01.

Additionally, the modification suggested by the Examiner would render the Keller device inoperable for its intended purpose. For example, if the motor of Keller was substituted for the dump load of Appellants' fuel cell system, the resulting system would be inoperative, barring a fundamental change in operation or structure. This is because the motor would be electrically coupled to the fuel cell stack whenever the bus voltage was above the threshold voltage, thereby increasing the supply of fuel and further increasing the bus voltage. The threshold condition would cause this operation to continually repeat, (*i.e.*, the threshold condition would continually be satisfied causing the pump to continuously supply fuel to the fuel cell stack) resulting in

catastrophic runaway. In reversing the determination of prima facie obviousness the Federal Circuit noted that where turning the prior art device upside down would render the prior art device inoperable for its intended purpose, there was no objective teaching for such modification, and the prior art in effect taught *away* from the invention. *In re Gordon*, at 902.

The only way to remedy the problem introduced by the proposed modification appears to be the eliminate the pump. There is no suggestion in the art for eliminating the pump, and doing so would ignore the express teachings and principal operation of Keller. In this respect it is clear that the references must be taken in their entirety, including those portions which argue against obviousness. *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 230 U.S.P.Q. 416, 420 (Fed. Cir. 1986). In particular, it is impermissible within the framework of 35 U.S.C. § 103 to pick and choose from a reference only so much of it as will support a conclusion of obviousness to the exclusion of other parts necessary to a full appreciation of what the reference fairly suggest to one skilled in the art. *Id.* at 419. Even assuming some suggestion for further modifying the teachings of Keller to eliminate the pump, such would render the motor superfluous, removing any possible motivation for including the motor beyond the Appellants' own teachings. In this respect we note that hindsight reconstruction is strictly forbidden. *MPEP* § 2142.

The Examiner contends that the proposed modification would not result in catastrophic runaway "because if serious, significant or a large number of unsatisfactory problems were readily apparent, the prior art would have reported or addressed them." Advisory Action mailed February 23, 2004, paragraph 3. Such a conclusion ignores the fact that no one in the prior art suggested coupling the motor of a fuel pump to provide additional fuel to a fuel cell stack in response to an overvoltage condition. The problem only arises by the structural modification proposed by the Examiner, and which further demonstrate the impracticality of such proposed modification.

In this regard, Appellants object to the Examiner's characterization of the claim limitations as being functional. Advisory Action mailed February 23, 2004, paragraphs 2-3. The "functionality or behavior" is the result of the circuit formed by specific structural arrangement of the various structural elements (*e.g.*, threshold detector, transistor, dump load), as recited in the claim. For example, the responsiveness of the first transistor to the stack terminal voltage is

the result of the electrical coupling to the threshold detector. In this respect, *every* circuit produces "functionality or behavior" and is the purpose of every circuit.

Appellants further note that the proposed modification changes the principle of operation of Keller. The Keller teaches a feedback mechanism that employs *fuel regulation to control output voltage*. As discussed above, for the modification proposed by the Examiner to work, the fuel pump would have to be disassociated from the motor. Such would fundamentally change the principal of operation of Keller, from a *feedback mechanism employing fuel regulation* to a *feed-forward mechanism employing an energy dissipating element*. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959); also see *MPEP* § 2143.01.

Further, Appellants' description, which defines the terms in the claims, draws a distinct dichotomy between work loads and dump loads. In particular, the work load includes the device to be powered by the fuel cell system such as a vehicle, appliance, computer and/or associated peripherals as well as portions of the fuel cell system such as the control electronics. *Specification*, page 5, line 23-page 6, line3. In contrast, the dump load includes a resistive element such as a resistor for thermally *dissipating excess power* when shunted across the high voltage bus, and may *also* include capacitive and/or inductive elements. *Specification*, page 7, lines 16-24. This is consistent with dictionary uses of the term dump. For example, the term "dump power" is defined as "electric power, generated by any source, which is in excess of the needs of the electric system and which cannot be stored or conserved." *McGraw-Hill Dictionary of Scientific and Technical Terms*, McGraw-Hill, Inc., New York, 5th Ed. Thus, as would be construed by one of skill in the art, and as further defined by the Appellants' specification, the electric motor 7 that drives the pump 8 in the Keller reference constitutes a work load rather than a dump load. In this respect, Appellants note the long standing case law that recognizes an applicant's right to act as their own lexicographer. *Hormone Research Foundation Inc. v. Genentech Inc.*, 904 F.2d 1558 (Fed. Cir. 1990).

Thus, Keller fails to teach or suggest a *first transistor is responsive to the stack terminal voltage to selectively couple the first dump load in parallel with the first set of fuel cells when the stack terminal voltage exceeds a threshold voltage and to uncouple the first dump load when the stack terminal voltage is below the threshold voltage,* as expressly recited in claim 1.

In rejecting claim 1, the Examiner appears to rely on EP-982788 for teaching the use of solid polymer electrochemical fuel cells. Appellants note that EP-982788 does not teach or suggest that a *first transistor is responsive to the stack terminal voltage to selectively couple the first dump load in parallel with the first set of fuel cells when the stack terminal voltage exceeds a threshold voltage and to uncouple the first dump load when the stack terminal voltage is below the threshold voltage,* as expressly recited in claim 1, so does not supply the teachings missing from Keller.

Since neither Keller nor EP-982788 teach or suggest the limitations of claim 1, the combination necessarily fails to teach or suggest the limitations of claim 1.

Claim 9 is dependent from claim 1. Claim 9 is allowable based on its dependency from claim 1 for all of the reasons set forth above with respect to claim 1.

Thus, the Examiner has failed to establish that Appellants' claims 1 and 9 are *prima facie* obvious.

C. Rejection of claim 2 under 35 U.S.C. § 103(a) based on Keller in view of EP-982788

Claim 2 is dependent on claim 1 and further recites, *inter alia*, "a second threshold detector," "a second transistor," and "a second dump load." Claim 2 is allowable based on its dependency from claim 1 for all of the reasons set forth above with respect to claim 1. Claim 2 is also allowable based on the additional limitations cited therein.

In particular, Keller fails to disclose or suggest a second threshold detector, a second transistor, or second dump load. Even if the motor taught by Keller constituted a first dump load and even if Keller taught multiple sets of fuel cells, there is no suggestion in the art to use separate dump loads for each set of fuel cells. In fact, under the Examiner's interpretation, Keller would actually teach a single "dump load" since only a single motor is taught. In this

respect, Appellants reiterate that the motor does not constitute a dump load, for the reasons stated above in reference to claim 1.

In rejecting claim 2, the Examiner appears to rely on EP-982788 for teaching the use of solid polymer electrochemical fuel cells. Appellants note that EP-982788 does not teach or suggest the use of multiple dump loads.

Since neither Keller nor EP-982788 teach or suggest the limitations of claim 2, the combination necessarily fails to teach or suggest the limitations of claim 2. Thus, the Examiner has failed to establish that Appellants' claim is *prima facie* obvious.

D. Rejection of claim 3 under 35 U.S.C. § 103(a) based on Keller in view of EP-982788

Claim 3 is dependent on claim 1 and further recites "wherein the dump load is positioned upstream from the solid polymer electrochemical fuel cells in an air flow for providing heat to the solid polymer electrochemical fuel cells." Claim 3 is allowable based on its dependency from claim 1 for all of the reasons set forth above with respect to claim 1. Claim 3 is also allowable based on the additional limitations cited therein.

The Examiner relies on Figure 1 of Keller for teaching that the load is located upstream from the fuel cells. *Office Action mailed November 24, 2003*, pages 5-6. Inspection of Figure 1, and reference to the description of Keller makes clear that there is no teaching or suggestion in Keller with respect to a position of the motor 7 relative to the fuel cell stack 2 in terms of an airflow. This should not be surprising since motors are typically designed to be electrically efficient, thus would not provide a good source of heat as would a resistive energy dissipating device. Keller is silent with respect to airflow, and does not disclose any fan or other device to provide an airflow, nor does Keller suggest using heat from the motor to warm the fuel cell stack.

In rejecting claim 3, the Examiner appears to rely on EP-982788 for teaching the use of solid polymer electrochemical fuel cells. Appellants note that EP-982788 does not teach or suggest that a dump load is positioned upstream from the solid polymer electrochemical fuel cells in an air flow for providing heat to the solid polymer electrochemical fuel cells.

Since neither Keller nor EP-982788 teach or suggest the limitations of claim 3, the combination necessarily fails to teach or suggest the limitations of claim 3. Thus, the Examiner has failed to establish that Appellants' claim is *prima facie* obvious.

E. Rejection of claim 4 under 35 U.S.C. § 103(a) based on Keller in view of EP-982788

Claim 4 is dependent on claim 1 and further recites "wherein the dump load is positioned proximate the solid polymer electrochemical fuel cells for providing heat thereto." Claim 4 is allowable based on its dependency from claim 1 for all of the reasons set forth above with respect to claim 1. Claim 4 is also allowable based on the additional limitations cited therein.

Again, the Examiner relies on Figure 1 of Keller for teaching that the load is located proximate the fuel cells. *Office Action mailed November 24, 2003*, pages 5-6. Appellants respectfully assert that inspection of Figure 1 suggests differently. The motor 7 appears to be distanced from the fuel cell battery or stack 2. In fact the motor is coupled to the pump 8 via a magnetic coupling 60, suggesting that the motor is physically isolated from the pump, fuel supply system and fuel cell stack or battery 2. Otherwise, the system would likely employ a less expensive and more reliable mechanical linkage between the motor and the pump.

In rejecting claim 4, the Examiner appears to rely on EP-982788 for teaching the use of solid polymer electrochemical fuel cells. Appellants note that EP-982788 does not teach or suggest that a position of a dump load with respect to the solid polymer electrochemical fuel cells, as recited by claim 4.

Since neither Keller nor EP-982788 teach or suggest the limitations of claim 4, the combination necessarily fails to teach or suggest the limitations of claim 4. Thus, the Examiner has failed to establish that Appellants' claim is *prima facie* obvious.

F. Rejection of claim 5 under 35 U.S.C. § 103(a) based on Keller in view of EP-982788

Claim 5 is dependent on claim 1 and further recites "a capacitance electrically coupled across the dump load." Claim 5 is allowable based on its dependency from claim 1 for all of the reasons set forth above with respect to claim 1. Claim 5 is also allowable based on the additional limitations cited therein.

The Examiner states that Keller teaches several capacitors, relying on passages at column 4, lines 1-5; column 5, lines 25-28 and lines 37-40, and claims 12 and 15-16. Those passages refer to capacitors identified by reference numerals 30, 36 and 49, respectively. Inspection of Figure 1, clearly shows that these capacitors are *not* electrically coupled across the motor 7, or across any dump load, as recited by claim 5.

In rejecting claim 5, the Examiner appears to rely on EP-982788 for teaching the use of solid polymer electrochemical fuel cells. Appellants note that EP-982788 does not teach or suggest a capacitance electrically coupled across a dump load as recited by claim 5.

Since neither Keller nor EP-982788 teach or suggest the limitations of claim 5, the combination necessarily fails to teach or suggest the limitations of claim 5. Thus, the Examiner has failed to establish that Appellants' claim is *prima facie* obvious.

G. Rejection of claim 6 under 35 U.S.C. § 103(a) based on Keller in view of EP-982788

Claim 6 is dependent on claim 1 and further recites "an inductance electrically coupled in series between the first set of solid polymer electrochemical fuel cells and the dump load." Claim 6 is allowable based on its dependency from claim 1 for all of the reasons set forth above with respect to claim 1. Claim 6 is also allowable based on the additional limitations cited therein.

The Examiner states that Keller teaches an inductor relying on the passage at column 5, lines 37-40, and claim 15. That passage refers to an inductor identified by reference numeral 48. Inspection of Figure 1, clearly shows that the inductor 48 is *not* electrically coupled in series between the set of solid polymer electrochemical fuel cells and motor 7, or any dump load as recited by claim 6.

In rejecting claim 6, the Examiner appears to rely on EP-982788 for teaching the use of solid polymer electrochemical fuel cells. Appellants note that EP-982788 does not teach or suggest an inductance electrically coupled in series between the first set of solid polymer electrochemical fuel cells and the dump load as recited by claim 6.

Since neither Keller nor EP-982788 teach or suggest the limitations of claim 6, the combination necessarily fails to teach or suggest the limitations of claim 6. Thus, the Examiner has failed to establish that Appellants' claim is *prima facie* obvious.

H. Rejection of claim 7 under 35 U.S.C. § 103(a) based on Keller in view of EP-982788

Claim 7 is dependent on claim 1 and further recites "wherein the first transistor is an n-channel field effect transistor." Claim 7 is allowable based on its dependency from claim 1 for all of the reasons set forth above with respect to claim 1. Claim 7 is also allowable based on the additional limitations cited therein.

The Examiner states that Keller reveals the use of an npn transistor, relying on column 6, lines 6-10. That passages describes the transistors as including an emitter 62 and collector 63, thus the npn transistor 64 taught by Keller is a bipolar junction transistor, *not* a field effect transistor as recited in claim 7. The Examiner has concluded, by way of the Restriction Requirement, that a pnp transistor FET is non-obvious over a npn FET. Consequently, it would appear disingenuous to now assert that a FET was obvious over a bipolar junction transistor, which are fundamentally different semiconductor devices.

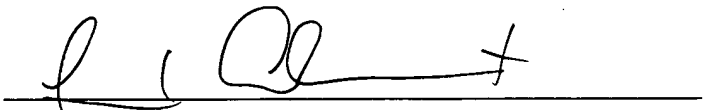
In rejecting claim 7, the Examiner appears to rely on EP-982788 for teaching the use of solid polymer electrochemical fuel cells. Appellants note that EP-982788 does not teach or suggest an n-channel field effect transistor as recited by claim 7.

Since neither Keller nor EP-982788 teach or suggest the limitations of claim 7, the combination necessarily fails to teach or suggest the limitations of claim 7. Thus, the Examiner has failed to establish that Appellants' claim is *prima facie* obvious.

IX. CONCLUSION

Appellants have shown above that the art of record does not establish a *prima facie* case of unpatentability of any pending claim. Accordingly, for at least the reasons set forth above, Appellants respectfully request that the Board reverse Examiner's rejections and hold all pending claims patentable over the art of record.

Respectfully submitted,
Seed Intellectual Property Law Group PLLC



Frank Abramonte
Registration No. 38,066

Enclosures:
Postcard
Two copies of this Appeal Brief

701 Fifth Avenue, Suite 6300
Seattle, Washington 98104-7092
Phone: (206) 622-4900
Fax: (206) 682-6031

496468_1.DOC

APPENDIX A

X. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

1. A fuel cell stack assembly for providing power to a working load, comprising:

a first set of solid polymer electrochemical fuel cells;

a first threshold detector responsive to a stack terminal voltage across the first set of solid polymer electrochemical fuel cells;

a first transistor coupled for activation via the first threshold detector; and

a first dump load, wherein the first transistor is responsive to the stack terminal voltage across the first set of fuel cells to selectively couple the first dump load in parallel with the first set of fuel cells when the stack terminal voltage across the first set of solid polymer electrochemical fuel cells exceeds a threshold voltage and to uncouple the first dump load when the stack terminal voltage across the first set of solid polymer electrochemical fuel cells is below the threshold voltage.

2. The fuel cell stack assembly of claim 1, further comprising:

a second set of solid polymer electrochemical fuel cells;

a second threshold detector responsive to an stack terminal voltage across the second set of solid polymer electrochemical fuel cells;

a second transistor coupled for activation via the second threshold detector; and

a second dump load, wherein the second transistor is responsive to the stack terminal voltage across the second set of fuel cells to selectively couple the second dump load in parallel with the second set of solid polymer electrochemical fuel cells when the stack terminal voltage across the second set of fuel cells exceeds a threshold voltage and to uncouple the second dump load when the stack terminal voltage across the second set of solid polymer electrochemical fuel cells is below the threshold voltage.

3. The fuel cell stack assembly of claim 1 wherein the dump load is positioned upstream from the solid polymer electrochemical fuel cells in an air flow for providing heat to the solid polymer electrochemical fuel cells.

4. The fuel cell stack assembly of claim 1 wherein the dump load is positioned proximate the solid polymer electrochemical fuel cells for providing heat thereto.

5. The fuel cell stack assembly of claim 1, further comprising:

a capacitance electrically coupled across the dump load.

6. The fuel cell stack assembly of claim 1, further comprising:

an inductance electrically coupled in series between the first set of solid polymer electrochemical fuel cells and the dump load.

7. The fuel cell stack assembly of claim 1 wherein the first transistor is an n-channel field effect transistor.

9. The fuel cell stack assembly of claim 1 wherein the first transistor is one of an n-channel bipolar junction transistor and a p-channel bipolar junction transistor.